

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Currently Amended) A system for measuring magnetic fields using a superconducting quantum interference device, wherein the system comprises:

an unmodulated flux locked loop including only linear, wide-band DC componentry and operable to achieve a substantially stable operating point at the superconducting quantum interference device; and

a coaxial transmission line adapted to electrically connect the unmodulated flux locked loop and the superconducting quantum interference device,

~~wherein the unmodulated flux locked loop is located in a non-cryogenic environment, and the coaxial transmission line is adapted to extend between the non-cryogenic environment and the superconducting quantum interference device.~~

2. (Canceled)

3. (Previously Presented) The system as set forth in claim 1, wherein the non-cryogenic environment is a magnetically unshielded environment.

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4. (Canceled)

5. (Previously Presented) A system for measuring magnetic fields using a superconducting quantum interference device, wherein the system comprises:

an unmodulated flux locked loop operable to achieve a substantially stable operating point at the superconducting quantum interference device;

a coaxial transmission line adapted to electrically connect the unmodulated flux locked loop and the superconducting quantum interference device;

a controlled-impedance bias tee operable to send a bias current into the superconducting quantum interference device and to receive an output signal generated by the superconducting quantum interference device via the coaxial transmission line;

a low noise amplifier operable to amplify the output signal generated by the superconducting quantum interference device;

a loop gain adjustment for optimizing performance of the unmodulated flux locked loop;

a first DC amplifier for amplifying an output of the low noise amplifier;

a first integrator network operable to facilitate achieving a stable phase locked feedback of the output signal generated by the superconducting quantum interference device;

a second DC amplifier for providing a wideband signal gain;

an offset adjustment device for adjusting a DC offset of an output of the first integrator network;

a second integrator network operating in conjunction with the first integrator network to provide performance of a two-pole integrator; and

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an output amplifier for amplifying an output of the second integrator network.

6. (Original) The system as shown in claim 5, wherein the first and second integrator networks are each a passive lead-lag network.

7. (Currently Amended) A system for measuring magnetic fields, wherein the system comprises:

a superconducting quantum interference device operable to detect changes in magnetic flux;

an unmodulated flux locked loop including only linear, wide-band DC componentry for achieving a substantially stable magnetic flux operating point at the superconducting quantum interference device by introducing a feedback magnetic flux that counteracts an externally applied magnetic field;

a first unbalanced coaxial transmission line for carrying a feedback signal corresponding to the externally applied magnetic field from the unmodulated flux locked loop to the superconducting quantum interference device; and

a second unbalanced coaxial transmission line both for carrying a bias current from the unmodulated flux locked loop to the superconducting quantum interference device and for carrying an output signal from the superconducting quantum interference device to the unmodulated flux locked loop,

wherein the superconducting quantum interference device is located in a cryogenic environment, the unmodulated flux locked loop is located in a non-cryogenic environment, and the first and second unbalanced coaxial transmission lines extend between the cryogenic environment and the non-cryogenic environment.

8. (Canceled)

9. (Previously Presented) The system as set forth in claim 7, wherein the non-cryogenic environment is a magnetically unshielded environment.

10. (Canceled)

11. (Previously Presented) The system as set forth in claim 7, wherein the unmodulated flux locked loop includes -

a controlled-impedance bias tee for sending the bias current into the superconducting quantum interference device and for receiving the output signal generated by the superconducting quantum interference device via the second unbalanced coaxial transmission line;

an impedance match for terminating the second unbalanced coaxial transmission line in a characteristic impedance of the second unbalanced coaxial transmission line;

a low noise amplifier for amplifying the output signal of the superconducting quantum interference device;

a loop gain adjustment for optimizing performance of the unmodulated flux locked loop;

a first DC amplifier for amplifying an output of the low noise amplifier;

a first integrator network for facilitating achieving a stable phase locked feedback of the output signal of the superconducting quantum interference device;

a second DC amplifier for providing a wideband signal gain;

an offset adjustment for adjusting a DC offset of an output of the first integrator network;

a second integrator network operating in conjunction with the first integrator network to provide performance of a two-pole integrator;

an output amplifier for amplifying an output of the second integrator network; and

a matching combiner for matching a characteristic impedance of the first unbalanced coaxial transmission line.

12. (Original) The system as shown in claim 11, wherein the first and second integrator networks are each a passive lead-lag network.

13. (Previously Presented) The system as set forth in claim 7, wherein the first unbalanced coaxial transmission line is impedance matched at the unmodulated flux locked loop and is not impedance matched at the superconducting quantum interference device.

14. (Previously Presented) The system as set forth in claim 7, wherein the second unbalanced coaxial transmission line is impedance matched at the unmodulated flux locked loop and is not impedance matched at the superconducting quantum interference device.

15. (Previously Presented) The system as set forth in claim 7, wherein the first and second unbalanced coaxial transmission lines are impedance matched at both the unmodulated flux locked loop and the superconducting quantum interference device.

16. (Previously Presented) A system for measuring magnetic fields, wherein the system comprises:

- a superconducting quantum interference device operable to detect changes in magnetic flux;
- an unmodulated flux locked loop for achieving a substantially stable magnetic flux operating point at the superconducting quantum interference device by introducing a feedback magnetic flux that counteracts an externally applied magnetic field, wherein the unmodulated flux locked loop includes only linear, wide-band DC componentry, and wherein the unmodulated flux locked loop is located in a non-cryogenic and magnetically unshielded environment;

- a first unbalanced RF coaxial transmission line for carrying a feedback signal corresponding to the externally applied magnetic field from the unmodulated flux locked loop to the superconducting quantum interference device; and

- a second unbalanced RF coaxial transmission line both for carrying a bias current from the unmodulated flux locked loop to the superconducting quantum interference device and for carrying an output signal from the superconducting quantum interference device to the unmodulated flux locked loop.

17. (Previously Presented) The system as set forth in claim 16, wherein the superconducting quantum interference device is located in a substantially cryogenic environment, and the first and second unbalanced RF coaxial transmission lines extend between the cryogenic environment and the non-cryogenic environment.



18. (Previously Presented) The system as set forth in claim 16, wherein the unmodulated flux locked loop includes -

- a controlled-impedance bias tee for sending the bias current into the superconducting quantum interference device and for receiving the output signal generated by the superconducting quantum interference device via the second unbalanced RF coaxial transmission line;

- an impedance match for terminating the second unbalanced RF coaxial transmission line in a characteristic impedance of the second unbalanced RF coaxial transmission line;

- a low noise amplifier for amplifying the output signal of the superconducting quantum interference device;

- a loop gain adjustment for optimizing performance of the unmodulated flux locked loop;

- a first DC amplifier for amplifying an output of the low noise amplifier;

- a first integrator network for facilitating achieving a stable phase locked feedback of the output signal of the superconducting quantum interference device, wherein the first integrator network is a first passive lead-lag network;

- a second DC amplifier for providing a wideband signal gain;

- an offset adjustment for adjusting a DC offset of an output of the first integrator network;

- a second integrator network operating in conjunction with the first integrator network to provide performance of a two-pole integrator, wherein the second integrator network is a second passive lead-lag network;

- an output amplifier for amplifying an output of the second integrator network; and

a matching combiner for matching a characteristic impedance of the first unbalanced RF coaxial transmission line.

19. (Previously Presented) The system as set forth in claim 16, wherein the first unbalanced RF coaxial transmission line is impedance matched at the unmodulated flux locked loop and is not impedance matched at the superconducting quantum interference device.

20. (Previously Presented) The system as set forth in claim 16, wherein the second unbalanced RF coaxial transmission line is impedance matched at the unmodulated flux locked loop and is not impedance matched at the superconducting quantum interference device.

21. (Previously Presented) The system as set forth in claim 16, wherein the first and second unbalanced RF coaxial transmission lines are impedance matched at both the unmodulated flux locked loop and the superconducting quantum interference device.

22. (New) The system as set forth in claim 1, wherein the unmodulated flux locked loop is located in a non-cryogenic environment, and the coaxial transmission line is adapted to extend between the non-cryogenic environment and the superconducting quantum interference device.